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ABSTRACT

Thirteen hyperactive and 13 control preschoolers participated in an examination of language and activity during listening tasks. Ss were administered three forms of the referential communication task. Their activity was recorded by a motion recorder strapped to the Ss' nondominant wrist and by observation. Transcriptions of the Ss' verbalizations during tasks were made according to productivity, dysfluencies, impulsive responses, commentary, nonwords, questions, and self guiding comments. Hyperactive Ss were more verbally and nonverbally active than control Ss during transitions between tasks and during the performance of listening tasks. However, task related movements failed to differentiate population groups. Results suggested that verbal activity was a supplementary form of self-generated stimulation. Verbal behavior of hyperactive Ss was characterized by proportionately more of the nonelicited language unrelated to the task and by greater dysfluency, but only during the referential communication tasks and training. (CL)

Language and Activity of Hyperactive and Comparison Children During Listening Tasks

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It was proposed in the present investigation that (quantitatively) more vocalizations and out-of-seat behavior would occur for hyperactive relative to comparison children during the performance of tasks requiring periods of nonresponding (i.e., delay or waiting). These periods of delay were hypothesized to produce insufficient input stimulation and thus to precipitate increased activity, similar to the performance and activity problems demonstrated for hyperactive children on repetitive, boring tasks (e.g., vigilance tasks, Zentall, 1981), on "experimenter paced" tasks (Douglas, 1972), and on tasks that require more extensive waiting (Zentall & Zentall, 1976). These predictions are consistent with the underarousal theory of hyperactivity (Zentall, 1975; Zentall & Zentall, 1976), i.e., hyperactive children are more readily underaroused especially in contexts or tasks involving minimal stimulation (e.g., reduced novelty) or structure (i.e., tasks in which multiple response alternatives exist, none of which is clearly delineated). According to the underarousal theory, hyperactive children will increase verbal and nonverbal activity in such contexts (e.g., delayed response or waiting) as a homeostatic means of maintaining adequate levels of stimulus input.

Thus the purposes of the present investigation were (a) to demonstrate that delayed-response tasks would precipitate increased activity and verbalization similar to the types of behavioral increases observed in low stimulation classroom contexts, (b) to determine the relationship between verbal and nonverbal activity for hyperactive and for nonhyperactive children, and (c) to determine the pre-eminence of verbal or nonverbal activity in contributing to teacher-rated hyperactivity during tasks that were selected to be analogous to classroom listening tasks.

METHOD

Subjects

The subjects were 13 hyperactive and 13 control Caucasian male children (ages 46 to 89 months) selected on the basis of high and low ratings on the Conners Abbreviated Teacher Questionnaire (Conners, 1973; see Zentall & Barack, 1979, for further reliability and validity data). Differences between groups in hyperactivity rating were observed, while differences in age and IQ were not found.

Procedural Summary of the Performance-Treatment Study

All 26 preschoolers were administered three forms of the referential communication task, using procedures, tasks, and a task order closely adapted from those of Glucksberg et al. (1966). During the first task the experimenter named animals and the child selected and stacked a set of six pictured animal blocks from the name referent, i.e., the Animal Names task. Task 2, Signal Training, was a short training session in which the child learned to press a buzzer to request cues necessary to select a correct stimulus picture. Task 3, Animal Details task, was derived from the animal naming task by adapting the instructions, i.e., by describing a detail of the animal instead of referring to its name. Task 4, Novel Forms task, was the referential task using blocks with novel or abstract forms. Task 5, Applied task, was designed to provide a more naturalistic analog to the laboratory type of referential tasks.

Measures

Behavior

Activity was recorded by an actometer (i.e., a Timex motion recorder No. 108; a modified self-winding calendar wristwatch) strapped to the child's non-dominant wrist.

Behavior was also recorded from behind a one-way mirror by an observer, blind to groups and hypotheses. An event recorder (Lafayette Mini Recorder #56042) was used to record the frequency and duration of two types of behavior--Bottom/Torso movement and Arm movement.

Actometer and event recorded activity were measured (a) across tasks 1, 2, and 3, including transitions between these tasks, and (b) separately for task 4, including one transition.

Language

Transcriptions were made of the verbalizations of each child for each task (Animal Names, Signal Training, Animal Details, Novel Forms, Applied task, and summaries of the transitional periods). Within each of these task/time periods, the following language measures were assessed, many of which have previously been reported to differentiate between population groups:

Productivity. Number of words and sentences, and mean length of sentence.

Dysfluencies. Starters, fillers, repetitions, and revisions.

Impulsive responses. Exclamations, Commands, and Interruptions by the child.

Commentary. Descriptions or evaluations of the task, the environment, or the self or the examiner.

Nonwords. Animal noises and other sounds (e.g., gun noises).

Questions. Qualitative evaluations of each sentence were made by classifying sentences into questions or statements. Questions were sub-classified as task-related or nontask.

Self-Guide. Self-guiding comments were considered to be task-related verbal behavior.

RESULTS AND DISCUSSION

Activity Data

Reliability

After practice with behavioral recordings using pilot children, two observers demonstrated reliable behavioral codings during a 45.1 minute observation session of a very hyperactive child. The mean ratio agreement was (a) 78% for Bottom/Torso frequency and 67% for duration, and (b) 86% for Arm Movement frequency and 91% for duration.

Activity Analyses

Data measured by the actometer (activity units) and event recorder (frequency and duration of Arm and Bottom/Torso movement) were recorded twice producing two sets of activity data. The first set included all the trials using the Animal Blocks (i.e., Animal Names and Animal Details, Signal Training, and several transitional periods). The second set included all the Novel Form trials and the transitional period that preceded the Novel task.

The duration scores obtained from event recorder tapes were converted from centimeters of movement to time scores. Frequency, duration, and actometer scores were divided by time-on-task, yielding movement per minute scores. Because the raw scores were not normally distributed, each score was transformed by a square root transformation. Scores from both the Animal block trials and Novel trials were then subjected to a multivariate analysis of variance (MANOVA). Where significant group effects were indicated by this analysis, univariate analyses of variance (ANOVA) were performed.

Language Data

Reliability

The written transcripts from six tasks for four children (two hyperactive and two controls) were scored independently by two different raters who were

blind to groups and hypotheses. Percent agreement for each child was then averaged and recorded by task and type oferror. Reliability across tasks and errors was 84%.

Productivity Analyses

The number of words and sentences was divided by the number of trials recorded for that task for each child. Square root transformed rates of words and sentences were subjected to a MANOVA for the factors of group (hyperactive vs. control) and the repeated factor of task.

Qualitative Analyses

Qualitative classifications of words were divided by the total number of words, in order to derive scores corrected for sample length. Classification of sentences into type of questions and statements were divided by number of sentences to similarly derive proportional scores. The individual proportion scores (e.g., Starters, Fillers) within each type of measure (e.g., Dysfluency) were summed for each child. Proportional data were summed across tasks (Animal Names, Training, Animal Details and Novel, i.e., an average of 30 min of data per child) and subjected to a nonparametric Wilcoxon due to the non-normality of the scores and the frequent occurrence of zero proportions.

Results and Discussion

In the present study, hyperactive children were more verbally and nonverbally active than were controls, during transitions between tasks and during the performance of listening tasks. Hyperactive children tilted their chairs, were out of their seats, sat on their feet, and leaned forwards and backwards more often and longer than control children. However, task-related movements failed to differentiate population groups (i.e., movements of the nondominant arm, recorded both by an observer and by a mechanical device). Activity of the nondominant hand was anticipated to be unrelated to task performance

(i.e., placing blocks on pegs), but in actuality, children stacked blocks with both hands, used both hands to sort through blocks, or used one hand for the signal and the other for blocks. Thus, the mechanical recording and the observer-recorded measures for arm movement yielded correlated measures of task-related responses during a manual performance task, rather than behavioral manifestations of hyperactivity.

The majority of hyperactive children who were more active were also more vocal, suggesting that verbal activity was a supplementary form of self-generated stimulation. There were, however, several hyperactive children who either talked or moved a lot, but not both. Comparison preschoolers, on the other hand, were sometimes observed to be loquacious, but rarely to be behaviorally active. Hyperactive children used more words, sentences per trial, and words per sentence while in the role of receivers of information. Apparently hyperactive children talk more than controls in task contexts even when there is no performance requirement to do so. These findings were replicated in the transitional time period analyses. During transitions there was also little apparent necessity for talking, and yet hyperactive children talked more than controls.

Qualitative analyses of the content of vocalizations suggested that several types of verbal behavior characterized hyperactive children. Proportionately more of the nonelicited language of the hyperactive children was classified as unrelated to the task (i.e., nontask-related Questions and Comments on the environment, self, and others). These differences between groups were not observed during transitions; thus comparison children may have selected these more appropriate transitional time periods to make "small talk." During task performance the hyperactive children also engaged in running commentaries about the task materials, repeated information, and

verbalized their block selections. It is not clear how commenting on the task was used by hyperactive children (i.e., whether it helped to guide attention and performance or simply maintained environmental contact).

The hyperactive children were also more Dysfluent, only during the referential communication tasks and training (i.e., not during transitions and the Applied task). Possibly because of the quantity of verbal and nonverbal activity that had to be continuously regulated, as well as to attend to the task, hyperactive children demonstrated poorer quality communication (i.e., dysfluencies). Verbal impulsivity was observed more for hyperactive children than for comparison children in task and nontask contexts, both of which required response delay. While this behavior characterized hyperactive children in all the response delay contexts, impulsive types of verbalization were twice as frequent during transitions when longer delays in responding were required.

Finally, in contrast to the observed differences between groups in nontask verbal and nonverbal behavior, differences between groups in the amount of (a) task-related activity(arm movement) and (b) task-related questioning and self-guiding comments were not demonstrated. Thus it appears that the task relatedness of the behavior of hyperactive children was not significantly different from controls. However, the increased need for self-generated stimulation in delayed-response tasks became channeled into supplementary gross motor movement of the bottom and torso and impulsive commenting and questioning.

The generality of these findings to natural contexts is suggested on several counts. First these receptive communication tasks were analogous to classroom listening tasks. Classroom tasks often require children to delay responding until the teacher has presented information or an assignment.

Second, the quantity and type of activity (Bottom/Torso and verbalizations) that characterized hyperactive children in the present study, were similar to quantitative differences in Out-of-Seat activity and Vocalizations observed for hyperactive children in familiar classroom settings (Zentall, 1980). Finally, the teacher ratings of hyperactivity, assessed from teacher observations of classroom behavior, were correlated with the amount of activity and verbalizations assessed in the delayed response tasks used in the present investigation. Thus, there seems to be considerable overlap between tasks requiring delayed responding and familiar (low stimulation) classroom contexts.

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